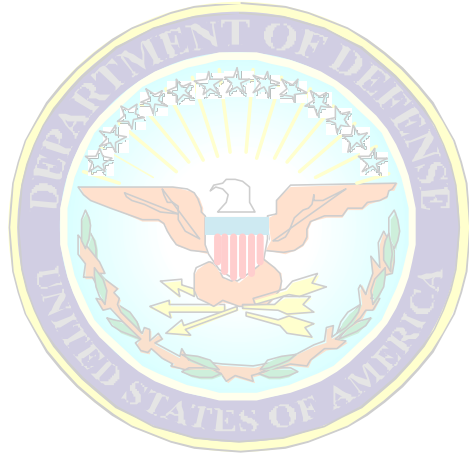


# Department of Defense Guide to Uniquely Identifying Tangible Items



## Assuring Valuation, Accountability and Control of Government Property

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(Acquisition, Technology & Logistics)

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# Chapter 1

## The Environment

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### THE GOVERNMENT PROPERTY MANAGEMENT CHALLENGE

The General Accounting Office (GAO) aptly describes the challenge faced by today's managers of Federal Government property: "GAO and other auditors have repeatedly found that the federal government lacks complete and reliable information for reported inventory and other property and equipment, and can not determine that all assets are reported, verify the existence of inventory, or substantiate the amount of reported inventory and property. These longstanding problems with visibility and accountability are a major impediment to the federal government achieving the goals of legislation for financial reporting and accountability. Further, the lack of reliable information impairs the government's ability to (1) know the quantity, location, condition, and value of assets it owns, (2) safeguard its assets from physical deterioration, theft, loss, or mismanagement, (3) prevent unnecessary storage and maintenance costs or purchase of assets already on hand, and (4) determine the full costs of government programs that use these assets. Consequently, the risk is high that the Congress, managers of federal agencies, and other decision makers are not receiving accurate information for making informed decisions about future funding, oversight of federal programs involving inventory, and operational readiness".<sup>1</sup> Further, the Congress has demanded greater fiscal accountability from managers of federal government property.<sup>2</sup>

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<sup>1</sup> GAO-02-447G, Executive Guide, Best Practices in Achieving Consistent, Accurate Physical Counts of Inventory and Related Property, March 2002, page 6.

<sup>2</sup> Ibid, page 5: The GAO observes that "In the 1990s, the Congress passed the Chief Financial Officers Act of 1990 and subsequent related legislation, the Government Management Reform Act of 1994, the Government Performance and Results Act of 1993, and the Federal Financial Management Improvement Act of 1996. The intent of these acts is to (1) improve financial management, (2) promote accountability and reduce costs, and (3) emphasize results-oriented management. For the government's major departments and agencies, these laws (1) established chief financial officer positions, (2) required annual audited financial statements, and (3) set expectations for agencies to develop and deploy modern financial management systems, produce sound cost and operating performance information, and design results-oriented reports on the government's financial position by integrating budget, accounting, and program information. Federal departments and agencies work hard to address the requirements of these laws but are challenged to provide useful, reliable, and timely inventory data, which is still not available for daily management needs."

## THE DEFINITION OF TANGIBLE ITEMS

For the purposes of this guide, Government property is viewed as tangible items, tangible meaning capable of being touched (or material).<sup>3</sup> An item is any article produced, stocked, stored, issued, or used.<sup>4</sup> Tangible items can be classified into the categories of Equipment, Repairables, Material, and Consumables.

- Equipment is defined as tangible items that are not held for sale or consumed in normal operations. This category includes military equipment, support equipment, general-purpose equipment, special test equipment, and special tooling. Includes Class VII, Major End Items, a final combination of end products that is ready for its intended use, that is, launchers, tanks, mobile machine shop, and vehicles, etc.<sup>5</sup>

- A reparable is an item of supply subject to economical repair for which repair (at either depot or field level) is considered in satisfying computed requirements at any inventory level.<sup>6</sup> Examples include aircraft engines, rotors, guidance systems, and electronic circuit boards. Excludes medical equipment parts.

- Material is defined as being of, composed of, or pertaining to physical substances.<sup>7</sup> Materials are tangible items that may lose their identity when incorporated in an end item. (e.g., sheet metal). The FAR 45.301 defines material as property that may be incorporated into or attached to a deliverable end item or that may be consumed or expended in performing a contract. It includes assemblies, components, parts, raw and processed materials, and small tools and supplies that may be consumed in normal use in performing a contract. It does not include real property, repairables<sup>8</sup>, or consumables.

- A consumable is an item of supply that is normally expended or used up beyond recovery in the use for which it is designed or intended (e.g. clothing and supplies).<sup>9</sup> For purposes of this guide, explosives are treated as consumable items; and bulk petroleum, oil and lubricants delivered by pipeline are excluded.

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<sup>3</sup>The American Heritage Dictionary, Office Edition, July 1987.

<sup>4</sup>DoD I 5000.64.

<sup>5</sup>DoD 4140.1-R.

<sup>6</sup>Ibid.

<sup>7</sup>The American Heritage Dictionary, op. cit.

<sup>8</sup> A reparable is an item of supply subject to economical repair for which repair (at either depot or field level) is considered in satisfying computed requirements at any inventory level (DoD 4140.1-R). Examples include aircraft engines, rotors, guidance systems, and electronic circuit boards. Excludes medical equipment parts.

<sup>9</sup>DoD 4140.1-R, op. cit.

## THE OBJECTIVES

Department of Defense (DoD) Instruction 5000.64, Defense Property Accountability, requires that accountability records be established for all property (property, plant and equipment) with a unit acquisition cost of \$5,000 or more, items that are sensitive or classified, and/or items furnished to third parties, regardless of acquisition cost. Property records and/or systems are to provide a complete trail of all transactions, suitable for audit.<sup>10</sup>

DoD 4140.1-R requires accountability and inventory control requirements for property and materiel received in the wholesale supply system.

A key component of effective property management is to use sound, modern business practices.

In terms of achieving the desirable end state of integrated management of tangible items, the collective DoD goal shared by all functional processes involved in property management is to uniquely identify tangible items, while relying to the maximum extent possible on international standards and commercial item markings and not imposing unique Government requirements. Unique identification of tangible items will help achieve:

- Integration of item data across the Department of Defense (hereafter referred to as the Department), Federal and industry asset management systems, as envisioned by the DoD Financial Management Enterprise Architecture (FMEA)<sup>11</sup>, to include improved data quality and global interoperability and rationalization of systems and infrastructure.
- Improved item management and accountability.
- Improved asset visibility and life cycle management.
- Clean audit opinions on tangible item portions<sup>12</sup> of DoD financial statements.

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<sup>10</sup> The Instruction states that property accountability systems and records should include data elements such as Part Number, National Stock Number, serial numbers, bar codes, or other unique identifiers (e.g., hull, building, tail numbers, vehicle registration, disposal turn-in document number, as may be appropriate and necessary).

<sup>11</sup> In June 2001, the Secretary of Defense established the Financial Management Modernization Program (FMMP) as one of his top priorities. The FMMP is developing the FMEA that will provide a blue print for modernizing and standardizing DoD business processes and systems, to include requirements to facilitate capturing information on tangible items in property and inventory management systems.

<sup>12</sup> These financial statement portions are (1) Property, Plant and Equipment and (2) Operating Materials and Supplies.

## ITEM MANAGEMENT

The acquisition, production, maintenance, storage, and distribution of tangible items require complete and accurate asset records to be effective, and to ensure mission readiness. Such records are also necessary for operational efficiency and improved visibility, as well as for sound financial management. Physical controls and accountability over tangible items reduce the risk of (1) undetected theft and loss, (2) unexpected shortages of critical items, and (3) unnecessary purchases of items already on hand.

## THE PLAYERS

The principal functional stakeholders in item management are Engineering Management; Acquisition Management; Property, Plant and Equipment Accountability; Logistics Management and Financial Management. Asset visibility is crosscutting to these five functions. Their interests involve the following:

**Engineering Management.** DoD Directive 5000.1, Defense Acquisition System, requires that acquisition programs be managed through the application of a systems engineering approach that optimizes total system performance and minimizes total ownership costs. A modular, open-systems approach is employed, where feasible. For purposes of item management, engineering plays a crucial role in the documentation of technical data that defines tangible items and the configuration management of these items throughout their useful life.

**Acquisition Management.** The Federal Acquisition Regulation (FAR) Part 45, Government Property, prescribes policies for furnishing Government property to contractors including the use, maintenance, and management of Government-furnished property, contractor-acquired property, and for the return, delivery, or disposal of Government-furnished property and contractor-acquired property.

**Property, Plant and Equipment Accountability.** DoD Instruction 5000.64<sup>13</sup> provides a comprehensive framework for DoD property accountability policies, procedures, and practices; assists DoD property managers, accounting and financial officers, and other officials in

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<sup>13</sup>It integrates the broad requirements of the Federal Property and Administrative Services Act of 1949, as amended (Act of 30 June 1949, 63 Stat. 372), and the Chief Financial Officers (CFO) Act of 1990 into an overarching property accountability policy for property, plant and equipment. Complements the accounting and financial reporting requirements contained in DoD 7000.14-R.

understanding their roles and responsibilities relating to property accountability. It establishes accountability policy for property, plant, and equipment (PP&E); contains concepts useful for asset management throughout the Department, particularly for property in the possession of individual military units and end-users. It excludes property and materiel for which accountability and inventory control requirements are prescribed in DoD 4140.1-R and DoD 4000.25-2-M.<sup>14</sup>

## **Logistics Management and Accountability.** DoD

Directive 4140.1, Materiel Management Policy, specifies policies for materiel management. It is the Department's policy that:

- Materiel management is responsive to customer requirements during peacetime and war.
- Acquisition, transportation, storage, and maintenance costs are considered in materiel management decisions.
- Standard data systems are used to implement materiel management functions.
- The secondary item inventory is sized to minimize the Department's investment while providing the inventory needed to support peacetime and war requirements
- Materiel control and asset visibility are maintained for the secondary item inventory.

DoD 4000.25-M, Defense Logistics Management System (DLMS) Manual, prescribes logistics management policy, responsibilities, procedures, rules, and electronic data communications standards for the conduct of logistics operations in the functional areas of supply, transportation, acquisition (contract administration), maintenance, and finance.<sup>15</sup>

**Asset Visibility.** Asset visibility is the capability that provides Combatant Commanders, the Military Services, and the Defense Agencies with timely and accurate information on the location; movement; status; and identity of units, personnel, equipment, and supplies.<sup>16</sup>

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<sup>14</sup> Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP).

<sup>15</sup> The DLMS is a system governing logistics functional business management standards and practices rather than an automated information system.

<sup>16</sup> "In every troop deployment this century, DoD has been plagued by a major difficulty—the inability to *see* assets as they flow into a theater and are in storage. This situation has led to direct and significant degradation in operational readiness. When assets in the pipeline are not visible, they are difficult to manage. Property is lost, customers submit duplicate requisitions, superfluous materiel chokes the transportation system, and the cycle continues. Assets at the retail level that are not visible and, therefore, not available for redistribution, further compound the degradation of operational readiness." - Joint Total Asset Visibility Strategic Plan, January 1999, Joint Total Asset Visibility Office, DoD.

**Financial Management.** DoD Instruction 7000.14, Defense Financial Management Regulation, specifies that all DoD Components shall use a single DoD-wide financial management regulation for accounting, budgeting, finance, and financial management education and training. That regulation is DoD 7000.14-R. It directs financial management requirements, systems, and functions for all appropriated, non-appropriated, working capital, revolving, and trust fund activities. In addition, it directs statutory and regulatory financial reporting requirements.

## PROCESSES, ACTIVITIES AND ACTIONS

Item management involves many functional processes, activities and actions, all focused on operations involving tangible items. These operations must be integrated and flow smoothly so that the needs of warfighters for tangible items are satisfied when and where they occur. The functional processes, activities and actions impacting tangible item management are arrayed in Table 1 in summary format to show how they are related and dependant.

**TABLE 1. Functional Processes Impacting Item Management**

<b>Functional Processes</b>	<b>Activities</b>	<b>Actions</b>
Fund	Requirements	Identify needs
Acquire	Engineering Materiel Management Cataloging	Assign part number Request part number Assign stock number
Produce & Accept	Process Control	Apply & inspect item marking
Transport	Transportation	Track items
Stock	Stocking	Stock, locate and retrieve items
Order	Requisitioning	Request item supply
Supply	Shipping	Locate and ship items
Use	Receipt	Receive, install and use items

Repair	Maintenance	Restore reparable items
Rebuild	Overhaul	Refurbish items
Decommission	Demilitarization	Remove ownership markings, leave the Unique Identification data elements
Dispose	Disposal	Sell/recycle scrap
Pay	Requirements	Settle invoices
Account	Inventories Financial Statements	Manage & control Property valuation

## Chapter 2

# The Need to Uniquely Identify Items

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## DIFFERENTIATING ITEMS THROUGHOUT THE SUPPLY CHAIN

The Department must, of necessity, uniquely identify the tangible items to which it takes title to provide for better asset accountability, valuation and life cycle management. Unique identification provides the Department the opportunity to differentiate an individual item from all others. Unique identification of tangible items provides the Department with the source data to facilitate accomplishment of the following:

- Improve the acquisition of equipment and performance based logistics services for the warfighter,
- Capture timely, accurate and reliable data on tangible items (i.e., equipment, materials, and consumables),
- Improve life-cycle asset management, and
- Track items in the Department and industry systems for operational, logistic<sup>17</sup> and financial accountability purposes.

## ACCOUNTING FOR ACQUIRED TANGIBLE ITEMS

Accountability of tangible items begins when hardware (equipment), and supplies (materials and consumables) are acquired through purchase, lease, or other means, including transfer or fabrication, whether the hardware and supplies are already in existence or must be created, developed, demonstrated and evaluated.<sup>18</sup> DoD Instruction 5000.64 requires that accountable records be established for all property (i.e., property, plant and equipment) purchased, having a unit acquisition cost of over \$5,000 or more, items that are classified or sensitive, and items located at third parties, regardless of acquisition cost.<sup>19</sup> Property accountability records and systems should follow the 5000.64 exactly: Part number, cost, national stock number, serial numbers, bar codes, or other unique identifiers (e.g., hull, building numbers, aircraft tail numbers,

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<sup>17</sup> DOD 4140.1-R, May 2003, chapter 5, section C5.7.3, addresses Unique Item tracking policy for logistics.

<sup>18</sup> See American Society for Testing and Materials Standard E-2135-02, Standard Terminology for Property and Asset Management.

<sup>19</sup> DoDI 5000.64, August 13, 2002, op. cit., paragraph 5.3.1.

vehicle registration, disposal turn-in document number, as may be appropriate and necessary), as well as other data elements.<sup>20</sup>

For materiel covered under DoD 4140.1-R, accountable records are established for all materiel received, regardless of cost.<sup>21</sup>

## CONTRACTOR-ACQUIRED PROPERTY ON COST-REIMBURSEMENT TYPE CONTRACTS

Title to property whose cost is reimbursable to the contractor passes to and vests in the Government upon: (1) Delivery to the contractor of an item purchased by the contractor and reimbursed as a direct cost under the contract, (2) Issuance of the property for use in contract performance; (3) Commencement of processing of the property or use in contract performance; or (4) Reimbursement of the cost of the property by the Government, whichever occurs first. The Government acquires title to all Special Test Equipment (STE) purchased or fabricated by the contractor and may take title to Production Special Tooling in accordance with the contract clauses. However, if such items are to be delivered to the Government, they must be delivered under a contract line.

## ESTABLISHING ITEM ACQUISITION COST

It is essential that contracts contain specific arrangements to capture the acquisition cost of all delivered items because the acquisition cost will form the basis for the entries made in Department's financial statements and will determine the degree to which those statements comply with the requirements of the Federal Accounting Standards Board (FASAB). Ideally, acquisition cost for tangible items would be recorded at the time these items are received by the government at the point of receipt. However, as a practical matter, acquisition cost is generally recorded at contract award when Contracting Officers include administrative arrangements in contracts so that both the UID and the acquisition cost of items that will be delivered under the contract can be reflected in the Department's property accountability and management information systems.

### Using Contract Line Items.

All property delivered to the Government must be delivered on a contract line item. The acquisition cost of each item entering the Government property inventory is captured on the contract line item (CLIN), a subline (SLIN) item, or an informational subline item. Informational subline

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<sup>20</sup> Ibid, paragraph 5.3.3 contains the list of all data elements.

<sup>21</sup> See Section C5.3, Item Accountability, Control and Stewardship, DoD 4140.1-R.

items are used to capture the UID and the acquisition cost for items to be delivered, but are never priced separately for payment purposes.

CLINs, SLINs, and informational SLINs are established when the contract is structured prior to award and must be included for all items for which the Government will take delivery, either during the performance of or at completion of the contract. The acquisition cost of property to be delivered will be identified at contract award and appropriately updated to reflect contract modifications that impact acquisition cost.

The preferred approach for identifying the acquisition cost of items delivered under a contract is for the items to be separately priced under CLINs or SLINs. Informational subline items are used to capture the acquisition cost for items to be delivered when separately priced CLINs or SLINs are not practicable. Informational SLINs used only for identification of acquisition cost have to be clearly marked as such so they are not confused with delivery, acceptance, and payment requirements of the contract. When the acquisition costs for like items differs, separate informational SLINs must be used to identify the acquisition cost for each of the items with a different acquisition cost.

The Contracting Officer will modify a contract to establish separate CLINs prior to delivery of items that were not identified as contract deliverables at the time of contract award.

## Valuation of Tangible Items

Both the unique identification and the value of items that will be delivered under the contract need to be reflected in the Department's property accountability and management information systems. According to DoD Instruction 5000.64, acquisition cost should be the basis for valuation of property.

Acquisition cost is defined as the amount, net of both trade and cash discounts, paid for the property, plus transportation costs and other ancillary costs.<sup>22</sup> According to DoD 4140.1-R, items in inventory are valued at their latest acquisition cost.<sup>23</sup>

Generally, acquisition cost is recorded at contract award. For fixed price contracts, the acquisition cost for items to be delivered is the fixed price paid by the Government. For cost type contracts, the acquisition cost for items to be delivered is the total estimated cost for those items negotiated

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<sup>22</sup> DODI 5000.64, August 13, 2002, op. cit., paragraph E2.1.6.

<sup>23</sup> See Section C4.7, Supply System Inventory Report (SSIR), DoD 4140.1-R.

at the time of award. For any item estimated to cost more than \$100,000, the contractor should be required to establish separate cost collection to ensure the Government has an accurate basis for valuation following delivery. For any item expected to cost less than \$100,000, the acquisition cost may be estimated based upon the contractor's records.

Contractors will be required to value discrete (unique) contractor acquired property for accounting, to include subcontracted items. They should propose CLINs based on their engineering bill of materials or their proposed bill of materials for items that will require unique identification.

Contracts must identify procedures that will allocate changes in the value of the contract to the acquisition cost of delivered items. The procedure may use --

- the Contractor's accounting system to separately collect the cost of those items being fabricated or acquired in order to determine acquisition cost, or
- estimates or formulas to determine acquisition cost.

The acquisition cost of components delivered within end items need not be identified.

## Chapter 3

# Determining Uniqueness of Tangible Items

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### WHAT IS AN ITEM?

An item is a single article or a unit formed by a grouping of component or constituent parts. In the Department, an item is any article produced, stocked, stored, issued, or used;<sup>24</sup> or any product, including systems, materiel, parts, subassemblies, sets, accessories, etc.<sup>25</sup>

### DECIDING WHAT ITEMS ARE TO BE IDENTIFIED AS UNIQUE

The unique identification of tangible items is driven by an integrated set of logistics, acquisition and financial requirements to track and identify item information. Figure 1 contains a decision tree for deciding what tangible items<sup>26</sup> should be uniquely identified for DoD purposes. The program manager is responsible for having items uniquely identified.

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<sup>24</sup> Ibid, paragraph E2.1.20. MIL STD 130 defines an item as “a non-specific term used to denote any unit or product including materials, parts, assemblies, equipment, accessories, and computer software.”

<sup>25</sup> MIL HDBK 61A(SE), Configuration Management Guidance, 7 February 2001, page 3-8.

<sup>26</sup> **Equipment** - Tangible items that are not intended to be held for sale or consumed in normal operations. Includes military equipment, support equipment, general-purpose equipment, special test equipment, and special tooling. Includes Class VII, Major End Items, a final combination of end products that is ready for its intended use, that is, launchers, tanks, mobile machine shop, and vehicles, etc. (DOD 4140.1-R). It does not include real property, reparables, consumables or materials.

**Reparable** - An item of supply subject to economical repair for which repair (at either depot or field level) is considered in satisfying computed requirements at any inventory level (DOD 4140.1-R). Examples include aircraft engines, rotors, guidance systems, and electronic circuit boards. Excludes medical equipment parts.

**Consumables** - A consumable is an item of supply that is normally expended or used up beyond recovery in the use for which it is designed or intended (DOD 4140.1-R) (e.g. clothing and supplies). For purposes of this decision tree, explosives are treated as consumable items; and bulk petroleum, oil and lubricants delivered by pipeline are excluded. For packaging purposes, the Department might request additional marks/information in the mark that vendors should be able to provide without difficulty, or significant expense.

**Material** - Of, composed of, or pertaining to physical substances (The American Heritage Dictionary, Office Edition, July 1987). Materials are tangible items that may lose their identity when incorporated in an end item. (e.g., sheet metal). FAR 45.301 defines material as property that may be incorporated into or attached to a deliverable end item or that may be consumed or expended in performing a contract. It includes assemblies, components, parts, raw and processed materials, and small tools and supplies that may be consumed in normal use in performing a contract.

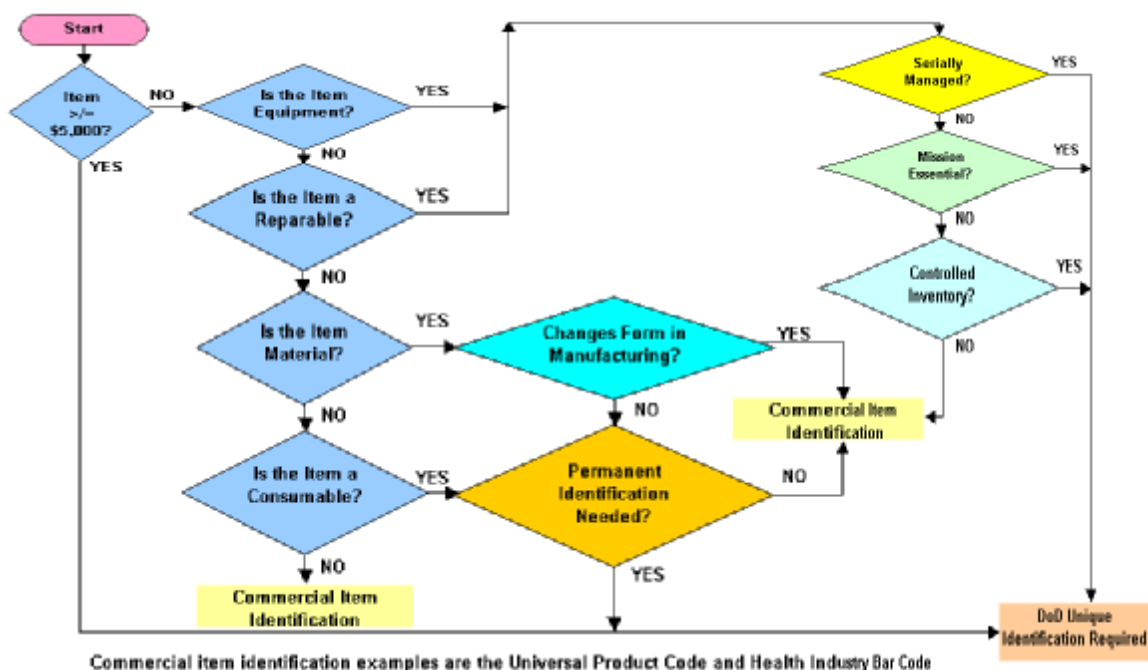


Figure 1. Uniquely Identifying Tangible Items

Commercial item identification on tangible items will be accepted as long as it meets data requirements for unique identification. Generally, industry places sufficient information on items to distinguish between unlike items. The Global Trade Identification Number (GTIN) is an example of an acceptable commercial identification of commodity items. Health care products marked according to the Health Industry Bar Code (HIBC) Standard are another example of acceptable commercial identification because they include Labeler Identification Codes within each barcode to identify individual manufacturers or healthcare providers.

Contracts will require unique item identification, or a DoD recognized unique identification equivalent<sup>27</sup>, for all property items delivered to the Government if: (1) The acquisition cost is \$5,000 or more, (2) it is either a serially managed, mission essential or controlled inventory<sup>28</sup> piece of

<sup>27</sup> Some examples of commercial unique identification that may be recognized as equivalent, depending on the circumstances, are the Global Trade Identification Number for commodity items, the Global Individual Asset Identifier for serially-managed assets, the Health Industry Bar Code for health care products, or the Vehicle Identification Number for vehicles.

<sup>28</sup> **Serially Managed** - Includes reparable items down to and including sub-component reparable unit level; life-limited, time-controlled, or items requiring records (e.g., logbooks, aeronautical equipment service records, etc.); and items that require technical directive tracking at the part level [DUSD(Logistics & Material Readiness) Memorandum, September 4, 2002, Serialized Item Management].

**Mission Essential/Item Essentiality** - A measure of an item's military worth in terms of how its failure (if a replacement is not immediately available) would affect the ability of a weapon system, end item, or organization to perform its intended functions. (DOD 4140.1-R).

**Controlled Inventory** - Those items that are designated as having characteristics that require that they be identified, accounted for, segregated, or handled in a special manner to ensure their safeguard and integrity. Includes classified items (require protection in the interest of national security), sensitive items (require a

equipment or a reparable item, or a consumable item or material where permanent identification is required, (3) it is a component of a delivered item, if the program manager has determined that unique identification is required, or (4) a UID or a DoD recognized UID equivalent is available.

## DEFINING THE DATA ELEMENTS FOR UNIQUE IDENTIFICATION

### What is a Unique Identifier?

A unique identifier is a set of data for tangible assets that is globally unique and unambiguous, ensures data integrity and data quality throughout life, and supports multi-faceted business applications and users. There are two key considerations in the unique identification of tangible items.

### The Notion of an Enterprise

The first is enterprise identification. An enterprise is the entity responsible for assigning the unique identifier to a tangible asset. Enterprise means a business organization or firm, which is defined as a commercial partnership of two or more persons<sup>29</sup>. For purposes of unique identification, an enterprise identifier will define each business location that has its own unique, separate and distinct operation. An enterprise identifier is a code uniquely assigned to an enterprise by a registration (or controlling) authority. A registration (or controlling) authority is an organization responsible for assigning a non-repeatable identifier to an enterprise [i.e., Dun & Bradstreet's Data Universal Numbering System (DUNS) Number, Uniform Code Council (UCC)/EAN International (EAN) Company Prefix, Allied Committee 135 Commercial and Government Entity (CAGE) Number, or the Coded Representation of the North American Telecommunication Industry Manufacturers, Suppliers, and Related Service Companies (ANSI T1.220) Number].

### Unique Identification of Items

The other key aspect of UID is the unique identification of each item that the enterprise produces. Unique identification depends upon a

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high degree of protection and control due to statutory requirements or regulations, such as precious metals; items of high value, highly technical, or hazardous nature; and small arms), and pilferable items (items having a ready resale value or application to personal possession, which are especially subject to theft,) (DOD 4140.1-R); and safety controlled items. UID can be applied at the discretion of the program/item manager for pilferable items.

<sup>29</sup> MIL STD 130 also defines manufacturer as "an individual, company, corporation, firm, or Government activity who: (a) Controls the production of an item, or (b) produces an item from crude or fabricated materials, or (c) assembles materials or components, with or without modification, into more complex items."

combination of data elements, which is determined by how the enterprise serializes tangible items. There are two acceptable methods of serialization – (1) Serialization within the enterprise identifier, and (2) Serialization within the part number. Serialization within the enterprise identifier occurs when each tangible item is assigned a serial number that is unique among all the tangible items identified under the enterprise identifier and is never used again. The enterprise is responsible for ensuring unique serialization within the enterprise identifier. Serialization within the part number occurs when each tangible item of a particular part number is assigned a unique serial number within the original part number assignment. The enterprise is responsible for ensuring unique serialization within the original part number.

## Serialization Within the Enterprise Identifier

For items that are serialized within the enterprise identifier, unique identification is achieved by a combination of the issuing agency code<sup>30</sup>, enterprise identifier and the serial number, which must be unique within the enterprise identifier. The unique serial number within the enterprise identifier is a combination of numbers or letters assigned by the enterprise (i.e., a manufacturer or vendor) to an item that provides for the differentiation of that item from any other like or unlike item and is never used again within the enterprise identifier. The data elements of enterprise identifier and unique serial number within the enterprise identifier provide the permanent identification for the life cycle of the item.

## Serialization Within the Part Number

For items that are serialized within the part number, unique identification is achieved by a combination of the issuing agency code, enterprise identifier, the original part number, and the serial number. The original part number is a combination of numbers and letters assigned by the enterprise (i.e., a manufacturer or vendor) at asset creation to a class of items with the same form, fit, function, and interface. The serial number within the part number is a combination of numbers and letters assigned by the enterprise (i.e., a manufacturer or vendor) to an item that provides for the differentiation of that item from any other like item. The data elements of enterprise identifier, original part number and serial number within the original part number provide the permanent identification for the life cycle of the item.

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<sup>30</sup> The issuing agency code, or IAC, is that assigned by the Registration Authority for ISO/IEC 15459-2, Registration Procedures. The current Registration Authority of ISO/IEC 15459-2 is NEN – Nederlands Normalisatie-instituut. The IAC represents the registration authority that issued the enterprise identifier. The IAC can be derived from the data qualifier for the enterprise identifier and does not need to be marked on the item.

## Issuing Agency Codes for Use in Unique Identification

At the current time, issuing agency codes (IACs) exist for three of the four most commonly used enterprise identifiers. These IACs are “UN” for the DUNS enterprise identifier assigned by Dun & Bradstreet, “either 0 to 9” for the EAN.UCC Company Prefixes assigned by EAN.UCC, and “LB” for ANSI T1.220 numbers. There is no IAC yet for the CAGE/NCAGE assigned by Allied Committee 135. Until such time as an IAC becomes available for the CAGE/NCAGE enterprise identifier, enterprises will have to use either their DUNS, EAN.UCC Company Prefix, or ANSI T1.220 Number to construct the UID.

## INCLUDING UNIQUE IDENTIFICATION DATA ELEMENTS ON A TANGIBLE ITEM

### Derivation of the Unique Identifier

The unique identifier can be derived from the data elements included on the item by using a business rule (See Appendix C). This derivation occurs in the software of the automatic identification technology (AIT) device<sup>31</sup> that machine-reads the data elements on the item. Therefore, it is not necessary to include the unique identifier on the item as a separate data element. It is only required that the unique identification data elements of enterprise identifier, serial number and, for construct #2, original part number be included on each item<sup>32</sup>. Table 2 shows how the unique identifier is constructed from the data elements placed on the item and the business rule. When deriving the unique identifier, the data qualifiers are eliminated from the final number.

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<sup>31</sup> Such devices are readers, scanners and interrogators.

<sup>32</sup> The UID component data elements, at a minimum, shall be contained in a Data Matrix ECC200 symbol. Data may be contained in other AIT media (e.g., contact memory buttons, linear bar codes, radio frequency identification, etc.) in addition to the Data Matrix.

	UID Construct #1	UID Construct #2
Based on current enterprise configurations	If items are serialized within the Enterprise	If items are serialized within Part Number
UID is derived by concatenating the data elements IN ORDER:	(Issuing Agency Code)* Enterprise ID Serial Number	(Issuing Agency Code)* Enterprise ID Original Part Number Serial Number
Data Identified on Assets Not Part of the UID (Separate Identifier)	Current Part Number	Current Part Number
*The Issuing Agency Code (IAC) represents the registration authority that issued the enterprise identifier (i.e., Dun and Bradstreet, UCC.EAN). The IAC can be derived from the data qualifier for the enterprise identifier and does not need to be marked on the item.		

**Table 2. Unique Identifier (UID) Construct Business Rule<sup>33</sup>**

Thus, there are two constructs for determining the unique identifier, depending upon whether the enterprise serializes tangible items within the enterprise identifier or within the original part number. Although not used to determine the unique identifier, other data elements, such as the current part number, may also be placed on the tangible item.

## Unique Identification Derivation Process

Figure 2 depicts how the unique identifier is derived and the business rule for generating the item unique identifier from the data elements placed on the item<sup>34</sup>. The AIT reader device will machine-read the data elements and output the concatenated unique identifier for onward transmission to the appropriate automated information system (AIS). The decisions of which construct to use (see Table 2) to uniquely identify items, and use of the associated business rules, are made by the enterprise assigning serialization to the item.

<sup>33</sup> In instances where the original part number changes with new configurations (also known as part number roll), the current part number may be included on the item as a separate data element for traceability purposes.

<sup>34</sup> The registration authority for the enterprise identifier, or the issuing agency code (IAC), is derived by the AIT device from the data qualifier for the enterprise identifier. The IAC is not placed on the item.

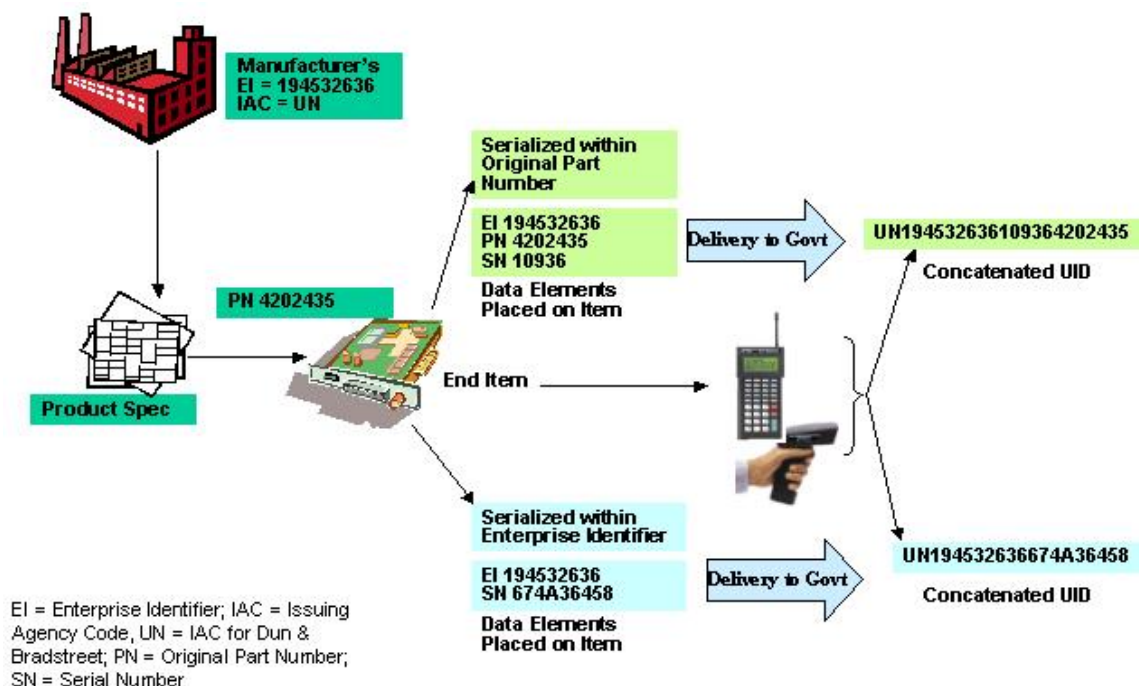


Figure 2. Unique Identifier (UID) Determination Process

## Deciding Where to Place Data Elements for Unique Identification on Items

Data elements for unique identification (enterprise identifier, serial number and, for Construct 2 only, original part number) will be placed on qualifying items in accordance with the standard practice of MIL-STD-130, Identification Marking of U.S. Military Property. Commercial-off-the-shelf items that qualify for UID marking, which are incorporated into end items, will be marked so that a UID can be derived.

## Deciding When to Place Data Elements on the Item to Derive the Unique Identification

Strategies that produce the greatest business advantage for the tangible items at the lowest cost and in the shortest possible time should be considered. The question of how this could be done leads to a conclusion that the probable scenario would be a mixture of *vendor-applied-at-source*, *opportunity-based*, *seek-and-apply*, and *gated* strategies<sup>35</sup>. Requiring vendor-applied-at-source on future contracts for new equipment, major modifications, and procurements of end items and

<sup>35</sup> See Ronald W. Durant and Owen R. Thompson, "Concept of Operations for AIT in an Automated Maintenance Environment for Army Weapon Systems", Executive Summary and Report (Volume 2), AR130T1, March 2002.

spares is important for sustainment, but has limited impact on a retrospective application program.

### **Vendor-Applied-at-Source**

Vendor-applied-at-source provides a relatively cheap and unobtrusive application option for future purchases; however, it will not provide the speed of response necessary to successfully implement a retrospective application program for legacy items.

### **Opportunity-Based Item Application**

Opportunity-based item application can be done in the field or factory, wherever it is convenient to gain access to items either on an end item or available in a storage facility. Projected situations or processes where this might be deployed include phase maintenance, scheduled servicing, depot rebuild or overhaul processes, and work-order processes during modification.

### **Seek-and-Apply**

The seek-and-apply strategy can be used for particular items held within service, either at the end item or in storage. This strategy is dependent on establishing the location and availability of items before deployment of application equipment and teams. The location of items can be determined through the supply chain management information systems and inventory control systems. This approach is dependent upon good legacy data, and will demand greater overhead of coordinated effort to effect access to the assets. By concentrating application efforts, the advantage is faster fielding of configuration management for specific items.

### **Gated**

The interception of items as they transit specific gates within the supply chain can ensure no item enters service without the data elements needed to construct a unique identifier. Having identified an item at the gate which requires a unique identifier, the situation can be resolved by either diverting the item back to the vendor for application, provision of an application capability at the specific supply gate, or diversion of the item to a centralized application facility.

## **USE OF THE UNIQUE IDENTIFIER IN AUTOMATED INFORMATION SYSTEMS**

In the Service or Agency material management and supporting automated information systems (AISs) (developed or maintained in compliance with FMIP/FMEA requirements), once the unique identifier is created from the separate data elements placed on the item, the unique identifier shall not

be parsed to determine the original elements, since parsing and recombination of the elements will invariably result in the introduction of errors in the unique identifier; however the UID, the enterprise identifier, the serial number and, in the case of Construct #2, the original part number will be captured separately at the time of inspection and acceptance. The unique identifier shall be a primary pointer or key data element for traceability in all computational functions including inventory acceptance, item accountability, storage, issue, receipt, valuation, maintenance, and disposal.

## ROLES AND RESPONSIBILITIES FOR PROPERTY RECORDS

DoD Instruction 5000.64<sup>36</sup> provides a comprehensive framework for DoD property accountability policies, procedures, and practices; assists DoD property managers, accounting and financial officers, and other officials in understanding their roles and responsibilities relating to property accountability. It establishes accountability policy for property, plant, and equipment (PP&E); contains concepts useful for asset management throughout the Department, particularly for property in the possession of individual military units and end-users. Section 5.3 addresses accountability records. It excludes property and materiel for which accountability and inventory control requirements are prescribed in DoD 4140.1-R and DoD 4000.25-2-M.<sup>37</sup>

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<sup>36</sup>It integrates the broad requirements of the Federal Property and Administrative Services Act of 1949, as amended (Act of 30 June 1949, 63 Stat. 372), and the Chief Financial Officers (CFO) Act of 1990 into an overarching property accountability policy. Complements the accounting and financial reporting requirements contained in DoD 7000.14-R.

<sup>37</sup> Military Standard Transaction Reporting and Accounting Procedures (MILSTRAP).

# Appendix A - Definitions

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## Key Definitions

**Marking** - The application of legible numbers, letters, labels, tags, symbols, or colors to ensure proper handling and identification during shipment and storage (DOD 4140.1-R).

**Item** - A generic term meaning any article produced, stocked, stored, issued, or used (DoD I 5000.64).

**Item Identification** - Sufficient data to establish the essential characteristics of an item that give the item its unique character and differentiate it from other supply items (DOD 4140.1-R).

**Tangible** - Capable of being touched; material (The American Heritage Dictionary, Office Edition, July 1987).

**Material** - Of, composed of, or pertaining to physical substances (The American Heritage Dictionary, Office Edition, July 1987). Materials are tangible items that may lose their identity when incorporated in an end item. (e.g., sheet metal). FAR 45.301 defines material as property that may be incorporated into or attached to a deliverable end item or that may be consumed or expended in performing a contract. It includes assemblies, components, parts, raw and processed materials, and small tools and supplies that may be consumed in normal use in performing a contract.

**Equipment** - Tangible items that are not intended to be held for sale or consumed in normal operations. Includes military equipment, support equipment, general purpose equipment, special test equipment, and special tooling. Includes Class VII, Major End Items, a final combination of end products that is ready for its intended use, that is, launchers, tanks, mobile machine shop, and vehicles, etc. (DOD 4140.1-R). It does not include real property, reparables, consumables or materials.

**Reparable** - An item of supply subject to economical repair for which repair (at either depot or field level) is considered in satisfying computed requirements at any inventory level (DOD 4140.1-R). Examples include aircraft engines, rotors, guidance systems, and electronic circuit boards. Excludes medical equipment parts.

**Consumables** - A consumable is an item of supply that is normally expended or used up beyond recovery in the use for which it is designed or

intended (DOD 4140.1-R) (e.g. clothing and supplies). For purposes of this decision tree, explosives are treated as consumable items; and bulk petroleum, oil and lubricants delivered by pipeline are excluded. For packaging purposes, the Department might request additional marks/information in the mark that vendors should be able to provide without difficulty, or significant expense.

**Serially Managed** - Includes reparable items down to and including sub-component reparable unit level; life-limited, time-controlled, or items requiring records (e.g., logbooks, aeronautical equipment service records, etc.); and items that require technical directive tracking at the part level [DUSD(Logistics & Material Readiness) Memorandum, September 4, 2002, Serialized Item Management].

**Mission Essential/Item Essentiality** - A measure of an item's military worth in terms of how its failure (if a replacement is not immediately available) would affect the ability of a weapon system, end item, or organization to perform its intended functions. (DOD 4140.1-R).

**Controlled Inventory** - Those items that are designated as having characteristics that require that they be identified, accounted for, segregated, or handled in a special manner to ensure their safeguard and integrity. Includes classified items (require protection in the interest of national security), sensitive items (require a high degree of protection and control due to statutory requirements or regulations, such as precious metals; items of high value, highly technical, or hazardous nature; and small arms), and pilferable items (items having a ready resale value or application to personal possession, which are especially subject to theft) (DOD 4140.1-R); and safety controlled items.

## DoD 7000.14-R, DoD Financial Management Regulation

**Real Property.** Fixed assets that are comprised of land and the rights to land; buildings to include capitalized additions, alterations, improvements, and rehabilitations; and other structures and facilities. Real property does not include personal property (weapons systems and other military equipment). (FMR, Vol 1)

**General PP&E** consists of tangible assets that meet all of the following criteria:

- a. Have an estimated useful life of two years or more;
- b. Are not intended for sale in the ordinary course of operations;
- c. Are acquired or constructed with the intention of being used or being available for use by the entity; and

d. Have an initial acquisition cost, book value or, when applicable, an estimated fair market value (see paragraph 060202 for definitions of these terms) that equals, or exceeds, the DoD capitalization threshold. The current DoD capitalization threshold is \$100,000 for both General and Working Capital Funds. FMR, Vol 4, Chapter 6, Aug 2000, Property, Plant and Equipment

**Operating Materials and Supplies.** Operating materials and supplies consist of tangible personal property to be consumed in normal operations. Excluded are (a) goods that have been acquired for use in constructing real property, (b) stockpile materials, and (c) inventory. FMR, Volume 4, Chapter 4, Operating Materials and Supplies and Stockpile Materials, January 1995.

## DoD 4140.1R, DoD Material Management Regulation

AP16.13. **Consumable Item.** An item of supply (except explosive ordnance and major end items of equipment) that is normally expended or used up beyond recovery in the use for which it is designed or intended.

AP16.33. **End Item.** A final combination of end products, component parts, and/or materials ready for its intended use, e.g., a ship, tank, mobile machine shop, or aircraft [Joint Pub 1-02, reference (mmm)].

AP16.35. **Essential Item.** A support item or a repair part whose absence renders the supported system or end item inoperable.

AP16.61. **Item Essentiality.** A measure of an item's military worth in terms of how its failure (if a replacement is not immediately available) would affect the ability of a weapon system, end item, or organization to perform its intended functions.

AP16.104. **Property Accountability Record.** The official record of tangible personal property, including inventory, owned by the Department that is maintained to identify the quantities of items on-hand, unit prices, locations, physical condition, receipt and issue records, authorized stock numbers, item descriptions, and other such information necessary to properly account for materiel and exercise other inventory management responsibilities.

## DoD I 5000.64, Defense Property Accountability

E2.1.12.1. **Classified Items.** Items that require protection in the interest of national security.

E2.1.12.2. **Sensitive Items.** Items that require a high degree of protection and control due to statutory requirements or regulations, such as narcotics and drug abuse items; precious metals; items that are of a high value, highly technical, or a hazardous nature; and small arms, ammunition, explosives, and demolition material.

E2.1.12.3. **Pilferable Items.** Items that have a ready resale value or application to personal possession and that are, therefore, especially subject to theft. (DODI 5000.64)

E2.1.27.1. **Personal Property.** Any property including military equipment, but excluding real property, consumable items, component parts of a higher assembly, or items that lose their individual identity through use. Some personal property is subject to capitalization if its cost exceeds the DoD capitalization threshold, has an estimated useful life of 2 years or more, is not intended for sale in the ordinary course of operations, is acquired or constructed with the intention of being used or being available for use by an entity. Intangible assets such as software, copyrights, and similar intellectual assets are considered personal property so long as they meet these criteria. Cash, marketable securities (e.g., stocks and bonds), and accounts receivable are considered monetary (or liquid) assets rather than personal property.

## DUSD(Logistics & Material Readiness) Memorandum, September 4, 2002, Serialized Item Management

**Serially Managed Items.** Populations of selected items will be identified and each item in the population permanently marked to enable erialized item management. Selection of the populations to be managed shall be based on the potential benefits that will accrue from the enhanced management capabilities and increased information to be made available. As a minimum, it is appropriate to consider selecting item populations from within the following categories:

- repairable items down to and including sub-component repairable unit level,
- life-limited, time-controlled, or items with records (e.g., logbooks, aeronautical equipment service records, etc.), and

- items that require technical directive tracking at the part number level.

Three data elements will comprise the universally unique identification number for each serialized item:

- Original Equipment Manufacturer (OEM) identification code [Contract and Government Entity (CAGE) preferred, Dunn and Bradstreet Number, or UCC.EAN]
- OEM part or reference number, and
- OEM serial number (single use per manufacturer identification code)

## FAR 45, Subpart 45.3 - Providing Government Property to Contractors

**"Material,"** as used in this subpart, means property that may be incorporated into or attached to a deliverable end item or that may be consumed or expended in performing a contract. It includes assemblies, components, parts, raw and processed materials, and small tools and supplies that may be consumed in normal use in performing a contract.

## Appendix B - Where Does the Guidance Exist Today?

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Document Name
DFARS – Defense Federal Acquisition Regulation Supplement
MIL STD 129 – Military Marking for Shipment & Storage
MIL STD 130 – Identification Marking of US Military Property
DoD 4140.1-R – DoD Supply Chain Material Management Regulation
DoDI 5000.2 – Operation of the Defense Acquisition System
DoDI 5000.64 – Defense Property Accountability
DoD 7000.14R – Financial Management Regulations
CJCSI 3170.1C – Requirements Generation System
DCMA One Book
DoD MIL Handbook 61A (SE), Configuration Management
EIA Standard 836 – Configuration Management Data Exchange & Interoperability
ANSI/EIA 649 – National Consensus Standard for Configuration Management

# Appendix C - Business Rules (Version 3)

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## REQUIRING THE UNIQUE IDENTIFIER

1. A unique identifier (UID) is required for an item if it meets the DOD criteria described in the Unique Identification Guidance under “Uniquely Identifying Tangible Items”.<sup>38</sup>

## CREATING AND GENERATING THE UNIQUE IDENTIFIER

2. The UID shall be derived from its discrete, component data elements. The UID is not required to be marked on the item as a separate data element.
3. If the enterprise chooses to mark the UID as a discrete data element on the item, the component data elements must also be marked on the item as discrete data elements, in addition to the UID.
4. Data qualifiers (semantics) will define each machine-readable data element marked on the item.
5. If an enterprise serializes items within the enterprise identifier, the UID shall be derived by combining the following data elements, in order:
  - The issuing agency code (IAC), which shall be derived from the data qualifier for the enterprise identifier
  - The enterprise identifier, which shall be marked on the item
  - The serial number, which shall be marked on the item  
(*Note: This is referred to as UID Construct #1.*)
6. If an enterprise serializes items within part numbers, the UID shall be derived by combining the following data elements, in order:
  - The IAC, which shall be derived from the data qualifier for the enterprise identifier
  - The enterprise identifier, which shall be marked on the item
  - The original part number, which shall be marked on the item<sup>37</sup>
  - The serial number, which shall be marked on the item  
(*Note: This is referred to as UID Construct #2.*)

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<sup>38</sup> This item is still under discussion.

7. The IAC shall be derived from the data qualifier for the enterprise identifier. The IAC is not required to be marked on the item.
8. The list of DOD-accepted IACs can be found in the Unique Identification Guidance, Data Qualifiers Table.
9. The data qualifier associated with the serial number will identify which UID Construct should be used to build the UID.
10. If UID Construct #2 is used, the enterprise must maintain the original part number on the item for the life of the item.
11. The enterprise is responsible for ensuring that the serial number is unique within the enterprise identifier (for UID Construct #1) or unique within the original part number (for UID Construct #2).
12. The enterprise is responsible for ensuring that the part number is not duplicated within the enterprise.
13. The UID will not change over the life of the item. Therefore, the component data elements of the UID will not change over the life of the item.
14. The enterprise identifier of the enterprise that assigned the serial number to the item is the only enterprise identifier in the UID machine-readable code that can use a UID data qualifier for enterprise identifier. Other enterprise identifiers may be contained within the machine-readable code as long as they do not use a UID data qualifier.<sup>39</sup>
15. Data elements not required to construct the UID shall remain discrete but may be contained within the same mark or media as the UID-required elements, as long as:
  - The UID data elements are first in the sequence, and
  - All the data elements contained in the mark or media are properly identified with a data qualifier.
16. The UID component data elements, at a minimum, shall be contained in a Data Matrix ECC200 symbol. Data may be contained in other AIT media (e.g., contact memory buttons, linear bar codes, radio frequency identification, etc.) in addition to the Data Matrix. The physical marks that contain the UID-required elements shall remain legible and non-transferable until the item is destroyed.<sup>40</sup>

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<sup>39</sup> See the Unique Identification Guidance for a list of UID data qualifiers.

<sup>40</sup> This item is still under discussion.

17. Where space is available, human readable information for UID data elements should be marked on the item.<sup>41</sup>
18. High capacity Automatic Identification Technology (AIT) media shall utilize DOD-accepted syntax.

## METADATA REQUIREMENTS

19. The UID is a non-parsable field, not to exceed 50 characters in length. Overhead characters, such as syntax and data qualifiers, are eliminated from the string when the UID is constructed.<sup>40</sup>
  - The IAC string of characters will not exceed 3 characters
  - The enterprise identifier string of characters will not exceed 13 characters, excluding the data qualifier.
  - The original part number string of characters (including special characters) will not exceed 32 characters, excluding the data qualifier.
  - The serial number string of characters (including special characters) will not exceed 30 characters, excluding the data qualifier.
  - The sum of the maximum number of characters for each possible UID data element is 78. The enterprise is responsible for ensuring that the UID does not exceed 50 characters.
20. The UID string of data must have worldwide uniqueness (non-repeatable).
21. When constructing the UID:
  - Any spaces contained in the component data elements will be deleted
  - All special characters will be deleted from the enterprise identifier
  - All special characters, except for dashes (-) and forward slashes (/) will be deleted from the original part number and serial number
  - The UID may only contain uppercase English alphabet characters A through Z, numeric characters 0 through 9, and the special characters “-“ and “/”

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<sup>41</sup> This item is still under discussion.

## CAPTURING THE UNIQUE IDENTIFIER

22. For activities after initial delivery in support of the product life cycle, any entity that collects data about the item must be capable of associating the data with the UID in accordance with program requirements.
23. In a database, once the UID is derived, it shall not be parsed to determine the original elements.<sup>42</sup>
24. A database shall be capable of using the UID to retrieve the data record associated with the item represented by the UID.<sup>41</sup>

## USING THE UNIQUE IDENTIFIER

25. The UID cannot be reused once retired.

## SPECIAL RULES FOR EXISTING INVENTORY (Applies only to parts that are not marked with Machine Readable Information (MRI) today)

26. If an item is missing data elements required to construct the UID, use the following rules to create substitute numbers<sup>41</sup>:
  - If the enterprise identifier is missing, use the enterprise identifier of the activity that will physically mark the item.
  - If the part number is missing or cannot be determined, obtain a part number from the in-service engineer.
  - If the serial number is missing, assign a serial number locally. In this case, the enterprise identifier for the item must be changed to represent the activity that assigned the serial number.
27. For munitions (or other material) that cannot be uniquely identified using UID Construct #1 or #2, the government Program Manager may use the batch or lot data element as a prefix to the existing serial number in order to obtain uniqueness. A preferred alternative is to assign a wholly new serial number using UID Construct #1 to obtain uniqueness.<sup>41</sup>
28. If the item is unidentifiable, a UID should not be assigned.

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<sup>42</sup> This item is still under discussion.

## ITEMS “UNDER CONTRACT”

29. Once the contract is modified to include the UID requirements:

- If the contract is for delivery of new items to DOD, follow Rules 1 through 25.
- If the contract is for support involving existing inventory items, the Program Manager will determine whether to follow Rules 1 through 25, the Special Rules for Existing Inventory (Rules 26 through 28), or some combination thereof.

# Appendix D -The Mechanics of Unique Identification

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## STRUCTURING THE DATA ELEMENTS FOR UNIQUE IDENTIFICATION

This Appendix explains how data elements are currently structured using semantics and syntax. The concepts of semantics and syntax, which are used to identify and structure data so it can be read by any AIT device, are explained. Examples of current structures in industrial use are presented for ASC MH 10 Data Identifiers (Table 4) and Application Identifiers (Table 5). The historic use of Air Transport Association Common Support Data Dictionary/ISO TS 21849 Text Element Identifiers (TEIs) is discussed<sup>43</sup>. Since Data Identifiers (ISO/IEC 15434 Format 06) and Application Identifiers (ISO/IEC 15434 Format 05) are already approved by ISO, they are compliant with the collaborative solution. Table 6 represents how TEIs would be used in the collaborative solution.

### Semantics

For the unique identification data elements to be “machine-readable” by any AIT device, they must be identified by some means such that the reader device can recognize, through its resident software, what data element it is reading. This is accomplished by employing the concept of “semantics”, which is literally “the meaning of language”. For the purposes of constructing machine-readable data elements, semantics take the form of data qualifiers. These data qualifiers<sup>44</sup> have to define each data element placed on the item. The serial number identifier is used to tell the AIT devices whether to derive the unique identifier by using Construct #1 or Construct #2. Table 3 shows the different data qualifiers contained within the standards for each of the data elements that are used for determining uniqueness.

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<sup>43</sup> DoD has not approved the use of ISO TS 21849 in its acquisitions.

<sup>44</sup> There are three types of data qualifiers being used: Data Identifiers (DIs) (Format 06), Application Identifiers (AIs)(Format 05), and, within the aerospace industry, Text Element Identifiers (TEIs). ISO/IEC International Standard 15418, Information Technology – EAN/UCC Application Identifiers and ASC MH 10 Data Identifiers and Maintenance, governs DIs and AIs. Air Transport Association (ATA) Common Support Data Dictionary (CSDD) defines TEIs. ISO/IEC International Standard 15434, Information Technology – Syntax for High Capacity ADC Media, contains formats for DIs and AIs. DoD is preparing to submit a request to add TEIs to ISO/IEC 15434.

Data Element	Data Identifier (Format 06) ISO/IEC 15434	Application Identifier (Format 05) ISO/IEC 15434	Text Element Identifier ISO TS 21849 <sup>45</sup>
<b>Enterprise Identifier</b> <ul style="list-style-type: none"> <li>• CAGE/NCAGE</li> <li>• DUNS</li> <li>• EAN.UCC</li> <li>• ANSI T1.220</li> </ul> <b>(Most commonly used)</b>	17V 12V 18V	<i>TBD</i> <sup>46</sup>	<b>CAG</b> <b>DUN</b> <b>EUC</b>
<b>Serial Number within Enterprise Identifier</b>	<b>18S</b>	<b>8004</b> <sup>47</sup>	<b>SER</b>
<b>Serial Number within Original Part Number</b>	<b>S</b>	<b>21</b>	<b>SEQ</b>
<b>Original Part Number</b>	<b>1P</b>	<b>01</b>	<b>PNO</b>
<b>Current Part Number</b>	<b>30P</b>	<b>240</b>	<b>PNR</b>

Blank boxes indicate the need for updates to the semantics within the standards

**Table 3. Data Qualifiers**

## Syntax

Once the data elements are identified to the AIT device, the AIT device needs instructions on how to put the data element fields together to define the unique identifier. This is called “syntax”<sup>48</sup>. High capacity AIT devices used in unique identification shall conform to ISO/IEC International Standard 15434, Information Technology – Syntax for High Capacity ADC<sup>49</sup> Media. This standard defines the manner in which the data is transferred to the high capacity ADC media from a supplier’s information system and the manner in which the data is transferred to the recipient’s information system. This is crucial to the unique identifier, since the process of identifying and concatenating the data elements must be unambiguous.

<sup>45</sup> For Text Element Identifiers not included in ISO TS 21849, contact TC 20/WG 13.

<sup>46</sup> This data qualifier is yet to be determined.

<sup>47</sup> 8004 is the application identifier for the EAN.UCC Global Individual Asset Identifier (GIAI). The format of the GIAI is the combination of the EAN.UCC Company Prefix (up to 14 numerical characters) and an Individual Asset Reference (up to 30 alpha numeric characters), which is assigned by the holder of the EAN.UCC Company Prefix.

<sup>48</sup> The way words are put together to form constructions, such as phrases and sentences.

<sup>49</sup> ADC – Automatic Data Capture.

## EXAMPLES OF SEMANTICS AND SYNTAX CONSTRUCTIONS FOR THE UNIQUE IDENTIFIER

### Using ASC MH 10 Data Identifiers

Table 4 shows an example, using the data from Figure 2, of how the data elements would have to be encoded with data identifiers on the AIT media placed on or with the item.

Data Element	Data Identifier Format 06	Data Element Value	Encoded Data Element on AIT Media
Enterprise Identifier • DUNS	12V	194532636	12V194532636
Serial Number within Enterprise Identifier	25S	674A36458	25S674A36458
Serial Number within Original Part Number	S	10936	S10936
Original Part Number	1P	4202435	1P4202435
Current Part Number	30P	4202435-01	30P4202435-01

**Table 4. Example of the Use of Data Identifiers  
(Format 06 of ISO/IEC 15434)**

Recalling that the unique identifier is to be concatenated in the order Issuing Agency Code/Enterprise Identifier/Original Part Number/Serial Number for an enterprise that serializes within the part number, the unique identifier data elements would be encoded as follows using Format 06 for Data Identifiers of the ISO/IEC 15434 syntax:

$$[>^R_s 06^G_s 12V194532636^G_s 1P4202435^G_s S10936^R_s E_o T$$

Where:

[> = A three-character compliance indicator

$R_s$  = A Format Trailer Character to indicate the end of a data format envelope

06 = A format header which indicates Data Identifiers are being used

$G_s$  = A Data Element Separator used between data fields

12V = Data Identifier for DUNS code

194532636 = DUNS Code

**1P** = Data Identifier for part number assigned by supplier (Original)

**4202435** = Original part number

**S** = Data Identifier for serial number within the original part number

**10936** = Serial number within original part number

**<sup>E</sup>o<sub>T</sub>** = A Message Trailer which identifies the end of the message within the data stream

When the AIT device reads the data qualifier for the enterprise identifier, it will have what registration authority (that is, the Issuing Agency Code) issued the enterprise identifier available in its software. The AIT device can then attach the Issuing Agency Code (IAC) to the beginning of the UID concatenation. In this example the IAC for Dun & Bradstreet is “UN”.

For this example using Format 06 for ASC MH 10 Data Identifiers of ISO/IEC 15434, the unique identifier output from the AIT device, once the overhead and syntax are stripped away and the IAC has been added, would be UN194532636420243510936.

## Using Application Identifiers

Table 5 shows an example, using the data from Figure 2, of the use of application identifiers.

Data Element	Application Identifier Format 05	Data Element Value	Encoded Data Element on AIT Media
Enterprise Identifier • EAN.UCC	<i>TBD</i> <sup>50</sup>	12345	<i>TBD</i> 12345
Serialization within Enterprise Identifier	8004 <sup>51</sup>	12345674A36458	800412345674A36458
Serial Number within Original Part Number	21	10936	2110936
Original Part Number	01	4202435	014202435
Current Part Number	240	4202435-01	2404202435-01

**Table 5. Example of the Use of Application Identifiers  
(Format 05 of ISO/IEC 15434)**

<sup>50</sup> This application identifier has not yet been determined.

<sup>51</sup> 8004 is the application identifier for the EAN.UCC Global Individual Asset Identifier (GIAI). The format of the GIAI is the combination of the EAN.UCC Company Prefix (up to 14 numerical characters) and an Individual Asset Reference (up to 30 alpha numeric characters), which is assigned by the holder of the EAN.UCC Company Prefix.

Recalling that the unique identifier is to be concatenated in the order Issuing Agency Code/Enterprise Identifier/Original Part Number/Serial Number for an enterprise that serializes within the original part number, the unique identifier data elements would be encoded as follows using Format 05 for Application Identifiers of the ISO/IEC 15434 syntax:

$[>^R_s 05^G_s TBD12345^G_s 0142024352^G_s 2110936^R_s E_{oT}$

Where:

$[> =$  A three-character compliance indicator

$^R_s =$  A Format Trailer Character to indicate the end of a data format envelope

**05** = A format header which indicates Application Identifiers are being used

$^G_s =$  A Data Element Separator used between data fields

**TBD** = Application Identifier for EAN.UCC code yet to be determined

**12345** = EAN.UCC Code

**01** = Application Identifier for original part number

**4202435** = Original part number

**21** = Application Identifier for serial number within the original part number

**10936** = Serial number within original part number

$E_{oT} =$  A Message Trailer which identifies the end of the message within the data stream

When the AIT device reads the data qualifier for the enterprise identifier, it will have what registration authority (that is, the Issuing Agency Code) issued the enterprise identifier available in its software. The AIT device can then attach the Issuing Agency Code (IAC) to the beginning of the UID concatenation. In this example the IAC for EAN.UCC is “0”.

For this example using Format 05 for Application Identifiers of ISO/IEC 15434, the unique identifier output from the AIT device, once the overhead and syntax are stripped away and the IAC has been added, would be 012345420243510936.

The use of Application Identifiers in the construct of serialization within the enterprise is different enough to merit an additional example using the data in Table 5. Recalling that the unique identifier is to be concatenated in the order Issuing Agency Code/Enterprise Identifier/Serial Number Within Enterprise, the unique identifier data elements would be encoded as follows using Format 05 for Application Identifiers of the ISO/IEC 15434 syntax:

$[>^R_s 05^G_s 800412345674A36458^R_s E_{oT}$

Where:

[> = A three-character compliance indicator

$R_s$  = A Format Trailer Character to indicate the end of a data format envelope

**05** = A format header which indicates Application Identifiers are being used

$G_s$  = A Data Element Separator used between data fields

**8004** = Application Identifier for serialization within the enterprise

**12345674A36458** = Serial number within the enterprise, or Global Individual Asset Identifier, which is composed of the EAN.UCC Company Prefix (**12345**) and the Individual Asset Reference (**674A36458**)

$E_{OT}$  = A Message Trailer which identifies the end of the message within the data stream

For this example using Format 05 for Application Identifiers of ISO/IEC 15434, the unique identifier output from the AIT device, once the overhead and syntax are stripped away and the IAC has been added, would be 012345674A36458.

## Historic Use of Text Element Identifiers

Text Element Identifiers (TEIs)<sup>52</sup> are the preferred approach of the aerospace industry. The aerospace industry uses CAGE Code (TEI = CAG) to identify the manufacturer with serial number (TEI = SER) to provide unique identity of the item. The aerospace industry philosophy is no duplication of serial numbers within an enterprise, regardless of the product, so that a simple combination of Enterprise ID and serial number provides unique identification of that item forever. As revisions are implemented that change the form, fit or function of the part, the aerospace industry changes the part number (TEI = PNR) to reflect those changes. This is called “rolling the part number.”

As aerospace attempted to move TEIs into broader multi-industry use, they determined that additional TEIs were required to encode Enterprise Identifiers other than CAGE (DUNS Number (TEI = DUN), UCC Company Prefix (TEI = EUC)) Original Part Number (TEI = PNO), and Serial Number within Part Number (TEI = SEQ). It was also determined that they needed a separator that would not be used within data, as opposed to the “/” used in ATA Spec 2000, Chapter 9. Finally, it was determined that an unambiguous header/trailer was needed to identify that the data fields represented were in Text Element Identifier form.

The needed non-data separator and unambiguous header/trailer were

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<sup>52</sup> All TEIs are four characters in length, consisting of three letters followed by a space

available in ISO/IEC 15434; Syntax for High Capacity ADC Media, and this gave rise to the Collaborative Solution.

## The Collaborative AIT Solution<sup>53</sup>

The DoD has approved the use of ISO 15418 and ISO 15434 in its acquisitions. The use of ISO TS 21849 has not been approved. The DoD has established the collaborative solution “DD” format to enable the use of text element identifiers (TEIs) using the syntax of ISO 15434 until such time as the TEIs needed for unique identification are incorporated as approved semantics in ISO 15418.<sup>54</sup> While DoD clearly prefers the use of ISO 15434, the collaborative solution “DD” format may be used to accommodate the use of only those TEIs needed for unique identification in the ISO 15434 syntax in the interim.

The Department, along with its industry and international partners, clearly prefers use of constructs described in ISO/IEC 15434 to achieve interoperability in business intelligence. However, this requires ISO approval to add a new format to ISO/IEC 15434 for those ISO TS 21849 Text Element Identifiers (TEIs) used in UID. The Department values the formal ISO approval process and is preparing to submit a proposal to ISO/IEC JTC1/SC 31 seeking approval of a new format for the TEI addition. That approval process is lengthy, and, in the interim, a collaborative solution is necessary to create a near-term interoperable environment for UID enhancements to business intelligence to support coalition operations. This solution uses the structure of ISO/IEC 15434 as the UID syntax standard and the business rules in Appendix C. If approved, the new format shall be used and replace the interim “DD” format described in this guidance. Consideration and decisions on marking approaches should carefully weigh any impacts to changing from the “DD” format to an approved future format against any associated costs and strategic near term marking requirements. ISO/IEC 15434 is and will be the Department’s preferred approach on all new solicitations. The use of the collaborative solution format as described below should strictly be considered an interim approach.

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<sup>53</sup> The text is highlighted to emphasize that the use of the collaborative solution format as described should strictly be considered an interim approach.

<sup>54</sup> These TEIs are CAGE (CAG), DUNS (DUN) EAN.UCC (EUC), Serial Number within Enterprise (SER), Serial Number within Original Part Number (SEQ), Original Part Number (PNO) and Current Part Number (PNR).

## Using Text Element Identifiers in the Collaborative Solution

Table 6 shows an example, using the data from Figure 2, of the use of TEIs in the collaborative solution.

Data Element	TEIs <sup>55</sup>	Data Element Value	Encoded Data Element on AIT Media
Enterprise Identifier • DUNS	DUN	194532636	DUN 194532636
Serial Number within Enterprise Identifier	SER	674A36458	SER 674A36458
Serial Number within Original Part Number	SEQ	10937	SEQ 10937
Original Part Number	PNO	4202435	PNO 4202435
Current Part Number	PNR	4202435-01	PNR 4202435-01

**Table 6. Example of the Use of TEIs in the Collaborative Solution**

Recalling that the unique identifier is to be concatenated in the order Issuing Agency Code/Enterprise Identifier/Part Number/Serial Number for an enterprise that serializes within the part number, the unique identifier data elements would be encoded as follows using an interim, DoD-specific, Format DD (see note below) for TEIs utilizing the ISO/IEC 15434 syntax:

**[D]><sup>R</sup><sub>s</sub>DD<sup>G</sup><sub>s</sub>DUN 194532636<sup>G</sup><sub>s</sub>PNO 4202435<sup>G</sup><sub>s</sub>SEQ 10937<sup>R</sup><sub>s</sub><sup>E</sup>OT**

Where:

**[D]>** = A three-character compliance indicator

**<sup>R</sup><sub>s</sub>** = A Format Trailer Character to indicate the end of a data format envelope

**DD** = A special, interim DoD-specific format header, which indicates TEIs are being used in the collaborative solution

**<sup>G</sup><sub>s</sub>** = A Data Element Separator used between data fields

**DUN** = TEI for DUNS code

<sup>55</sup> All TEIs are four characters in length, consisting of three letters followed by a space. For Text Element Identifiers not included in ISO TS 21849, contact TC 20/WG 13.

**195432636** = DUNS Code

**PNO\_** = TEI for original part number

**4202435** = Original part number

**SEQ** = TEI for serial number within the original part number

**10936** = Serial number within original part number

**<sup>E</sup>o<sub>T</sub>** = A Message Trailer which identifies the end of the message within the data stream

When the AIT device reads the data qualifier for the enterprise identifier, it will have what registration authority (that is, the Issuing Agency Code) issued the enterprise identifier available in its software. The AIT device can then attach the Issuing Agency Code (IAC) to the beginning of the UID concatenation. In this example the IAC for Dun & Bradstreet is “UN”.

For this example using Format DD for TEIs using the ISO/IEC 15434 syntax, the unique identifier output from the AIT device, once the overhead and syntax are stripped away and the IAC has been added, would be UN195432636420243510936.

Note: ISO/IEC 15434, Syntax for High Capacity ADC Media, specifies a two-digit format header. Numbers 01- 09 and 11 are assigned. Numbers 00, 10 and numbers 12-99 are reserved for future use. This means that a format header for text element identifiers of the collaborative solution cannot be assigned a two-digit number without SC 31 approval, since all two digit numbers have been reserved. In the interim, to enable the collaborative solution utilizing the ISO/IEC 15434 syntax, the Department will use a special, interim DoD-specific format header, designated as “DD”, to indicate TEIs are being used in the collaborative solution.

# Appendix E -Glossary of Terms

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<b>ADC</b>	Automatic Data Capture
<b>AIA</b>	Aerospace Industries Association of America
<b>AIS</b>	Automated Information System
<b>AIT</b>	Automatic Identification Technology
<b>AT&amp;L</b>	Acquisition, Technology and Logistics
<b>ATA</b>	Air Transport Association
<b>CAGE</b>	Commercial And Government Entity
<b>CSDD</b>	Common Support Data Dictionary published by the ATA
<b>DCMA</b>	Defense Contract Management Agency
<b>DCMA One Book</b>	DCMA reference material for contractors
<b>DFARS</b>	Defense FAR Supplement
<b>DLIS</b>	Defense Logistics Information Service
<b>DoD</b>	Department of Defense
<b>DoD MIL HDBK 61A</b>	DoD Military Handbook: "Configuration Management Guidance"
<b>DoD 4140.1-R</b>	DoD Instruction: "DoD Material Management Regulation"; 05/1998
<b>DoDI 5000.2</b>	DoD Instruction: "Operation of the Defense Acquisition System" (Including Change 1); 23 October 2000
<b>DoDI 5000.64</b>	DoD Instruction: "Defense Property Accountability"; 13 August 2002
<b>DoD 7000.14-R</b>	DoD Instruction: "Department of Defense Financial Management Regulations (FMRs)"; date varies with volume
<b>DUNSÒ Number</b>	Dun & Bradstreet Data Universal Numbering System number
<b>DUSD (L&amp;MR)</b>	Deputy Undersecretary of Defense for Logistics & Material Readiness
<b>EAN</b>	European Article Numbering
<b>EIA</b>	Electronic Industries Alliance
<b>FAR</b>	Federal Acquisition Regulations
<b>FMEA</b>	DoD Financial Management Enterprise Architecture
<b>FMMP</b>	DoD Financial Management Modernization Program
<b>FMR</b>	DoD Financial Management Regulation
<b>IEC</b>	International Electrotechnical Committee
<b>IPT</b>	Integrated Product Team
<b>IS</b>	International Standard
<b>ISO</b>	International Organization for Standardization

<b>ISO-15418</b>	ISO Standard: “EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance”
<b>ISO-15434</b>	ISO Standard: “Syntax for High Capacity ADC Media”
<b>ISO/IEC 15459-2</b>	ISO/IEC 15459-2, Registration Procedures
<b>ISO TS 21849</b>	ISO TS 21849, Integrated Data Processing Materials Management
<b>IT</b>	Information Technology
<b>JCS</b>	Joint Chiefs of Staff
<b>JTC 1</b>	ISO/IEC Joint Technical Committee One
<b>MH 10</b>	The US Technical Advisory Group to ANSI
<b>MIL-STD-129</b>	Military Standard: “Military Marking for Shipment and Storage”
<b>MIL-STD-130</b>	Military Standard: “Identification Marking of U.S. Military Property”
<b>NATO</b>	North Atlantic Treaty Organization
<b>NCAGE</b>	NATO Commercial And Government Entity
<b>OSD</b>	Office of the Secretary of Defense
<b>PDUSD (ATL)</b>	Principal Deputy Undersecretary of Defense for Acquisition, Technology and Logistics
<b>PP&amp;E</b>	Property, Plant and Equipment
<b>SC 31</b>	ISO Sub Committee 31 (Automatic Data Capture)
<b>TC</b>	ISO Technical Committee
<b>TG</b>	US TAG Technical Group
<b>UCC</b>	Uniform Code Council
<b>UID</b>	Universal Identification/Universal Identifier
<b>USD (AT&amp;L)</b>	Undersecretary of Defense for Acquisition, Technology and Logistics
<b>US TAG</b>	U.S. Technical Advisory Group
<b>WG</b>	ISO Working Group